

**Citation:**

Winzenberg T, Shaw K, Fryer J, Jones G. Calcium supplements in healthy children do not affect weight gain, height, or body composition. *Obesity (Silver Spring)*. 2007 Jul; 15(7): 1,789-1,798.

**PubMed ID:** [17636098](#)

**Study Design:**

Meta-analysis or Systematic Review

**Class:**

M - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**

POSITIVE: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To use body composition and anthropometric data from randomized controlled trials (RCTs) of calcium supplementation in healthy children to determine whether calcium supplementation in healthy children affects weight or body composition.

**Inclusion Criteria:**

- RCTs of calcium supplementation (including by food) compared with placebo
- A treatment period of at least three months
- Participants were children (age less than 18 years) without coexistent medical conditions or treatments affecting bone metabolism
- Outcome measures included at least weight, but could also include body composition measures.

**Exclusion Criteria:**

None.

**Description of Study Protocol:****Recruitment**

- The search strategies (available in Appendix I) were applied to several electronic bibliographic databases
  - CENTRAL (Cochrane Central Register of Controlled Trials) (Issue 3, 2005)
  - MEDLINE (1966 to 1 April 2005)
  - EMBASE (1 April 2005)
  - CINAHL (1982 to 1 April 2005)
  - AMED (1985 to 1 April 2005)

- MANTIS (1880 to 1 April 2005)
- ISI Web of Science (1945 to 1 April 2005)
- Food Science and Technology Abstracts (1969 to 1 April 2005)
- Human Nutrition (1982 to 1 April 2005)
- Two reviewers independently assessed articles against inclusion criteria, extracted data and assessed quality of studies. Differences were resolved by consensus.

## Design

Systematic review (secondary, post hoc analysis performed on trials identified for a meta-analysis of RCTs).

## Statistical Analysis

- Heterogeneity of the data was assessed using a  $X^2$  test on N-1 degrees of freedom
- For weight, weighted mean differences (WMDs), i.e., mean in the supplemented group vs. mean in the control group were used
- For body fat measures, standardized mean differences (SMDs) were used to combine, in order of preference of choice of measure used, BMI, DXA measures of percent body fat or skinfold measures
- For lean mass, SMDs were also used. The SMD effect size was used to estimate an absolute benefit on lean mass in kilograms in the four studies that used this unit of measure, by estimating the pooled standard deviation (SD) from the means of the SD of the outcomes in treatment and control groups for each study and multiplying the SMD by this
- Relative difference in the change from baseline was estimated as the absolute benefit divided by the mean of all of the baseline means of the control groups, expressed as a percentage
- Meta-analysis was conducted using a fixed effects model using the Cochrane Collaboration Review Manager program (RevMan version 4.2.7).

## Data Collection Summary:

### Dependent Variables

Not applicable.

### Independent Variables

Not applicable.

### Control Variables

Not applicable.

## Description of Actual Data Sample:

- *Initial N*: 234 references to potential studies were screened
- *Attrition (final N)*:
  - 36 references to 19 studies were included in the systematic analysis
  - 17 studies contributed to the meta-analysis (2088 participants, 1005 of whom received calcium supplementation and 1083 of whom received placebo)
- *Ethnicity*: Studies of white, Asian, Chinese, Gambian, Jewish, Arab, and non-specified ethnicity

- *Anthropometrics*: No study reported differences between treatment and control groups at baseline for potential confounding factors such as age, weight, height, sex, ethnicity, pubertal status, dietary measures or physical activity, other than a slight difference in carbohydrate intake between calcium [ $224 \pm 14$  (SE) g per day, N=16] and placebo ( $190 \pm 10$ g per day, N=19) groups in the exercise sub-group of one study.

## Summary of Results:

### Key Findings

- There was no statistically significant effect of calcium supplementation on either weight [weighted mean difference (WMD), +0.14kg; 95% CI: -0.28, +0.57kg] or height (WMD, +0.22cm; 95% CI: -0.30, +0.74cm)
- Meta-analysis of body fat measures showed no effect [standardized mean difference (SMD), +0.04; 95% CI: -0.08, +0.15]
- Meta-analysis of the available data from five studies did not show an effect of calcium supplementation on lean mass measured by DXA (SMD, +0.14; 95%CI: -0.03, +0.31).

### Other Findings

- Funnel plots (data not shown) showed no evidence of publication bias
- The results did not materially change with sensitivity analysis omitting studies with imputed data and omitting the study using treatment received analysis.

## Author Conclusion:

Calcium supplementation in healthy children has no effect on weight, height, body fat or lean mass, regardless of age, pubertal status, sex, ethnicity and baseline calcium intake.

## Reviewer Comments:

### Strengths

- *Intention-to-treat data from trials was used wherever possible*
- *A sensitivity analyses was performed for the main effects omitting studies for which data were imputed, and omitting a study that used treatment received rather than intention to treat or available data analysis*
- *Funnel plots were performed used for assessment of publication bias*
- *Two independent reviewers evaluated articles for inclusion, extracted data and assessed the quality of studies*
- *Heterogeneity of studies was assessed*
- *Study inclusion criteria and search strategy is well-described.*

### Limitations

- *Since this was a secondary post hoc analysis of an existing meta-analysis of studies designed for measuring bone outcomes in healthy children, weight and body composition was measured as a secondary outcome. This limits the generalizability (lack of focus on obesity), but increases validity (low risk of bias)*
- *There were a limited number of studies assessing lean mass, which limited the strength of*

*these findings*

- *The search strategy was focused on bone osteoporosis, so relevant studies may have been missed*
- *No trials of dairy product supplementation met inclusion criteria for inclusion in the review*
- *There were only three studies that used samples with an average baseline calcium intake less than 400mg per day, so effect modification at very low levels of calcium cannot be excluded.*

#### **Research Design and Implementation Criteria Checklist: Review Articles**

##### **Relevance Questions**

- |    |   |     |
|----|---|-----|
| 1. | Will the answer if true, have a direct bearing on the health of patients?                       | Yes |
| 2. | Is the outcome or topic something that patients/clients/population groups would care about?     | Yes |
| 3. | Is the problem addressed in the review one that is relevant to nutrition or dietetics practice? | Yes |
| 4. | Will the information, if true, require a change in practice?                                    | Yes |

##### **Validity Questions**

- |    |  |     |
|----|--|-----|
| 1. | Was the question for the review clearly focused and appropriate?   | Yes |
| 2. | Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?  | Yes |
| 3. | Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?   | Yes |
| 4. | Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?   | Yes |
| 5. | Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?   | Yes |
| 6. | Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?   | Yes |
| 7. | Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described? | Yes |
| 8. | Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?   | Yes |
| 9. | Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?   | Yes |

10. Was bias due to the review's funding or sponsorship unlikely?

---

Yes